

**Program outcomes, program specific outcomes & course outcomes for
Department of Botany
J. N. College, Boko.**

The College is permanently affiliated to Gauhati University and it follows the programme wise curriculum designed by the university. The learning outcomes of the programmes and courses are stated clearly by the university. The same is published in the official website of the university which can be downloaded by the affiliated colleges.

The College has its own mechanism to communicate the learning outcomes of the curriculum to the teachers and the students. The following measures are adopted-

- Hard copy of syllabi and learning outcomes are available in all the departments for ready reference to the teachers and students.
- A web link to the Gauhati University Curriculum and learning outcomes of Programmes and Courses (both UG & PG) is also provided in the college website for reference.
- The departments also arrange Orientation Programmes/Tutorial Meetings to make the students aware of the curriculum and the learning outcomes.

Course outcomes:

Programme Outcome:

Developing intellectual, personal and professional skills of students in plant sciences and making them ready for advance studies in plant sciences

Programme Specific Outcome:

- ❖ On successful completion of the Programme, the students will be well aware of different plant groups and different branches of Plant Sciences
- ❖ They will learn the techniques of studying plants- basic techniques as well as advanced techniques.
- ❖ The students will also become aware of physiology and metabolism of different plant groups and their uses for human welfare.
- ❖ They become skilled in modern advanced branches like biochemistry, cytogenetics, molecular biology etc. and at the same time they develop the skill of traditional branches of botany like taxonomy, ecology, genetics, physiology, palynology, anatomy etc.
- ❖ The basic techniques of plant research like biostatistics, spectrometry, chromatography, microscopy, and bioinformatics are also learned in the course.
- ❖ Students also learn to write project reports.
- ❖ The course also helps in making a student responsible citizen well aware of need of environment conservation and ways to do so.

Paper	Course	Outcome
Semester- I Paper- BOT-HC-1016 BOT-HC-1016 BOT-HC-1026 BOT-HC-1026	 Phycology and Microbiology Practical Biomolecules and Cell Biology Practical	 In the theory and practical syllabus of first paper of this semester, students get to know about the different groups of plants. Details idea of algae as a whole is given in the first paper. In the second paper detail idea of cell and its organelles and the different major biomolecules involved in cell activities are studied and students get fundamental knowledge about the cell structure and functioning.
Semester- II Paper-BOT-HC-2016 BOT-HC-2016 BOT-HC-2026 BOT-HC-2026	 Mycology and Phytopathology Practical Archegoniate Practical	 Details idea of Fungi, including the structure, reproduction, special characters and utility to human and environment is given in the paper Bot-HC-2016. This paper also includes role of fungi in disease development and method of their control. In the paper Archegoniate details of bryophyte, pteridophytes and parts of Gymnosperms are given. In total of first and second semester theory and practical papers students get overall idea of all the lower plant groups which is very much necessary to have clear basics of plant sciences.
Semester –III Paper-BOT-HC-3016 Paper-BOT-HC-3026 Paper-BOT-HC-3026 BOT-SE-3014	 Morphology Anatomy and of Angiosperms Practical Economic Botany Practical Genetics Practical Biofertilizers	 Detail idea of external and internal structure of plants, their peculiarities and their adaptation is given in the paper. This paper provide knowledge about various economically important plants, their utility and commercial aspects This paper give detail about genes, their nature, behavior and roles in various aspects are given Biofertilizer paper give idea about various available organic manures their commercial production that far better than chemicals.

Semester-IV		
Paper-BOT-HC-4016	Molecular Biology Practical	This paper give detail study about DNA RNA their structure, types, replication, nature in cells
Paper-BOT-HC-4026	Plant Ecology and Phytogeography Practical	This paper provide information regarding various ecosystems and their components as well as different biomes and phytogeographical areas
Paper-BOT-HC-4036	Plant Systematics Practical	This paper provide details knowledge about system of classification of plants and their phylogenetic relationships.
BOT-SE-4014	Nursery and Gardening	The curriculum gives a comprehensive idea about the nursery and gardening techniques.
Semester-V		
Paper-BOT-HC-5016	Reproductive Biology of Angiosperms Practical	This paper provides knowledge about development of flower, anther, ovule along with megasporogenesis and microsporogenesis. It also includes details about pollination, embryo formation, polyembryony and apomixes.
Paper-BOT-HC-5026	Plant Physiology Practical	This paper includes water and nutrient uptake by plants, translocation along with different plant growth regulators and sensory photobiology (phytochrome, cryptochrome, phototropins).
BOT-HE-5016	Natural Resource Management Practical	This paper provides knowledge about different natural resources and its sustainable utilization along with resource management and conservation.
BOT-SE-5014	Horticultural Practices and Post Harvest Technology.	It includes detail idea of different horticultural techniques, salient features of ornamental plants, landscaping along with disease control in crops.
Semester-VI		
Paper-BOT-HC-6016	Plant Metabolism Practical	This paper provide information about concept of metabolism, carbon assimilation; carbohydrate, lipid and nitrogen metabolism; different carbon oxidation processes like glycolysis, TCA cycle, metabolism. It also includes signal transduction and ATP synthesis.
Paper-BOT-HC-6026	Plant Biotechnology Practical	This paper gives the insight of plant tissue culture, recombinant DNA technology, transgenic plants

BOT-HE-6016	Industrial and Environmental Microbiology	and applications of biotechnology. It gives the idea about different industrial uses of microbes including fermentation products, organic acids and other microbial production.
BOT-SE-6014	Dissertation works	The students are guided for dissertation works in different fields of botany and also guided to prepare dissertation reports after completion of works.
Semester- III Paper-M301(Theory)	Plant Ecology	The course content gives idea about ecological types and influence of environment on plants and plant type
M 302 M 303	Geography, Evolution Instrumentation and Laboratory Techniques Practical	The other theory paper gives idea about different plant study techniques involved in advance study of plants
Semester- IV Paper-M 401 M 402 M 403	Morphology, Palynology, Embryology of Angiosperms Plant Taxonomy Practical	The course outcome is of detail taxonomic and morphological developments of plants
Semester- V Paper-M 501 M 502 M 503	Microbiology and Immunology Plant Pathology and Lichen Cytogenetics, Plant Breeding and Biometrics	Students get idea about microorganisms, their benefits, physiology, metabolism, growth and role in environment. The paper two deals with plant diseases and their control and also about symbiotic organisms. The paper deals with cell genetic materials, their importance in genetic modifications, breeding techniques and their importance. Students also get skill of statistical analysis necessary for plant studies. The fourth theory paper is about economic importance of algae, fungi and

M 504	Applied Botany (algae, fungi, bacteria, breeding, climate & horticulture)	bacteria and different techniques of plant breeding and horticulture. The practical papers are supportive in developing skill of thought in theory papers.
M 505	Practical: Microbiology, Plant Pathology and Lichen	
M 506	Practical: Cytogenetics, Plant Breeding, Biometrics and Applied Botany	
Semester- VI		
Paper-M 601	Molecular Biology and Plant Biochemistry	On completion of course of 6th semester the students become well informed about molecular aspects of cell, physiology, the biochemical aspects of different physiological and metabolic functions taking place inside a plant cell. Also different physiological activities and their importance for higher studies of plant. This semester also deals with advance study of plants and its genomics with the help of computer databases in bioinformatics. Advance utilization of different plant groups are also thought in this semester. The practicals involve all advance techniques like chromatography, colorimetry, spectrometry, tissue culture etc.
M 602	Bioinformatics, Computer Application and Biotechnology	
M 603	Plant Physiology	
M 604	Applied Botany (Plant Resource Utilization)	
M 605	Practical: Molecular Biology, Biotechnology, Bioinformatics and Computer Application	
M 606	Practical: Plant Physiology and Plant Resource utilization	

Paper	Course	Outcome
Semester- I		
Paper- BOT-HC-1016	Phycology and Microbiology	In the theory and practical syllabus of first paper of this semester, students get to know about the different groups of plants. Details idea of algae as a whole is given in the first paper.
BOT-HC-1016	Practical	
BOT-HC-1026	Biomolecules and Cell Biology	In the second paper detail idea of cell and its organelles and the different major biomolecules involved in cell activities are studied and students get fundamental knowledge about the cell structure and functioning.
BOT-HC-1026	Practical	
Semester- II		
Paper-BOT-HC-2016	Mycology and Phytopathology	Details idea of Fungi, including the structure, reproduction, special characters and utility to human and environment is given in the paper Bot-HC-2016. This paper also includes role of fungi in disease development and method of their control.
BOT-HC-2016	Practical	
BOT-HC-2026	Archegoniate	In the paper Archegoniate details of bryophyte, pteridophytes and parts of Gymnosperms are given. In total of first and second semester theory and practical papers students get overall idea of all the lower plant groups which is very much necessary to have clear basics of plant sciences.
BOT-HC-2026	Practical	
Semester –III		
Paper-BOT-HC-3016	Morphology Anatomy and of Angiosperms Practical	Detail idea of external and internal structure of plants, their peculiarities and their adaptation is given in the paper.
Paper-BOT-HC-3026	Economic Botany Practical	This paper provide knowledge about various economically important plants, their utility and commercial aspects
Paper-BOT-HC-3026	Genetics Practical	This paper give detail about genes, their nature, behavior and roles in various aspects are given
BOT-SE-3014	Biofertilizers	Biofertilizer paper give idea about various available organic manures their commercial production that far better than chemicals.

Semester-IV		
Paper-BOT-HC-4016	Molecular Biology Practical	This paper give detail study about DNA RNA their structure, types, replication, nature in cells
Paper-BOT-HC-4026	Plant Ecology and Phytogeography Practical	This paper provide information regarding various ecosystems and their components as well as different biomes and phytogeographical areas
Paper-BOT-HC-4036	Plant Systematics Practical	This paper provides details knowledge about system of classification of plants and their phylogenetic relationships.
BOT-SE-4014	Nursery and Gardening	The curriculum gives a comprehensive idea about the nursery and gardening techniques.
Semester-V		
Paper-BOT-HC-5016	Reproductive Biology of Angiosperms Practical	This paper provides knowledge about development of flower, anther, ovule along with megasporogenesis and microsporogenesis. It also includes details about pollination, embryo formation, polyembryony and apomixes.
Paper-BOT-HC-5026	Plant Physiology Practical	This paper includes water and nutrient uptake by plants, translocation along with different plant growth regulators and sensory photobiology (phytochrome, cryptochrome, phototropins).
BOT-HE-5016	Natural Resource Management Practical	This paper provides knowledge about different natural resources and its sustainable utilization along with resource management and conservation.
BOT-SE-5014	Horticultural Practices and Post Harvest Technology.	It includes detail idea of different horticultural techniques, salient features of ornamental plants, landscaping along with disease control in crops.
Semester-VI		
Paper-BOT-HC-6016	Plant Metabolism Practical	This paper provide information about concept of metabolism, carbon assimilation; carbohydrate, lipid and nitrogen metabolism; different carbon oxidation processes like glycolysis, TCA cycle, metabolism. It also includes signal transduction and ATP synthesis.
Paper-BOT-HC-6026	Plant Biotechnology Practical	This paper gives the insight of plant tissue culture, recombinant DNA technology, transgenic plants

BOT-HE-6016	Industrial and Environmental Microbiology	and applications of biotechnology. It gives the idea about different industrial uses of microbes including fermentation products, organic acids and other microbial production.
BOT-SE-6014	Dissertation works	The students are guided for dissertation works in different fields of botany and also guided to prepare dissertation reports after completion of works.
Semester- III Paper-M301(Theory)	Plant Ecology	The course content gives idea about ecological types and influence of environment on plants and plant type
M 302 M 303	Geography, Evolution Instrumentation and Laboratory Techniques Practical	The other theory paper gives idea about different plant study techniques involved in advance study of plants
Semester- IV Paper-M 401 M 402 M 403	Morphology, Palynology, Embryology of Angiosperms Plant Taxonomy Practical	The course outcome is of detail taxonomic and morphological developments of plants
Semester- V Paper-M 501 M 502 M 503	Microbiology and Immunology Plant Pathology and Lichen Cytogenetics, Plant Breeding and Biometrics	Students get idea about microorganisms, their benefits, physiology, metabolism, growth and role in environment. The paper two deals with plant diseases and their control and also about symbiotic organisms. The paper three deals with cell genetic materials, their importance in genetic modifications, breeding techniques and their importance. Students also get skill of statistical analysis necessary for plant studies. The fourth theory paper is about economic importance of algae, fungi and

M 504	Applied Botany (algae, fungi, bacteria, breeding, climate & horticulture)	bacteria and different techniques of plant breeding and horticulture. The practical papers are supportive in developing skill of thought in theory papers.
M 505	Practical: Microbiology, Plant Pathology and Lichen	
M 506	Practical:Cytogenetics, Plant Breeding, Biometrics and Applied Botany	
Semester- VI		
Paper-M 601	Molecular Biology	This semester makes students skilled in latest plant studies and advance techniques involved therewith. On completion of course of 6th semester the students become well informed about molecular aspects of cell internal physiology, the biochemical aspects of different physiological and metabolic functions taking place inside a plant cell. Also different physiological activities and their importance for higher studies of plant. This semester also deals with advance study of plants and its genomics with the help of computer databases in bioinformatics. Advance utilization of different plant groups are also thought in this semester. The practicals involve all advance techniques like chromatography, colorimetry, spectrometry, tissue culture etc.
M 602	and Plant Biochemistry	
M 603	Bioinformatics, Computer Application and Biotechnology	
M 604	Plant Physiology	
M 605	Applied Botany (Plant Resource Utilization)	
M 606	Practical: Molecular Biology, Biotechnology, Bioinformatics and Computer Application	
	Practical: Plant Physiology and Plant Resource utilization	